



# BOTULISM

(See also **INFANT BOTULISM** and **WOUND BOTULISM**, below.)

1. **Agent:** Toxin produced by *Clostridium botulinum* (and rarely other clostridium species), a gram-positive bacillus. Most cases due to type A, B or E toxin, rarely F and G, cause human disease. *Clostridium butyricum* and *C. barati* can also produce E and F toxins. Heat-labile toxin is produced under anaerobic conditions extrinsically (food-borne botulism) or intrinsically in the gastrointestinal tract (adult intestinal botulism, infant botulism) or wound (wound botulism). Iatrogenic cases of botulism have occurred rarely in patients who have received botulism toxin for cosmetic purposes.

## 2. Identification:

a. **Symptoms:** Clinical manifestations are characterized by acute onset of bilateral cranial neuropathies associated with symmetric descending weakness (e.g. extreme dryness of the mouth, dysarthria, dysphonia, difficulty swallowing, facial weakness, blurry vision, ptosis, difficulty breathing, trunk and extremity weakness followed by lower extremities). Severity appears dose related. Nonspecific gastrointestinal symptoms may be seen. Usually fever is absent (unless wound has bacterial infection). Patient remains responsive with no sensory deficits (except blurred vision).

Death may occur from respiratory failure or superimposed infections.

b. **Differential Diagnosis:** Guillain-Barré syndrome (Miller-Fisher variant), myasthenia gravis (Tensilon edrophonium) tests are often falsely positive in patients with botulism, bacterial or chemical food poisoning, mushroom poisoning, chemical intoxication, congenital myopathy, Leigh syndrome, meningitis, myasthenia gravis, poliomyelitis, Reye's syndrome, Werdnig-Hoffman disease, West Nile virus, Lambert-Eaton myasthenic syndrome, cerebrovascular accident, tick paralysis

(perform tick check), neoplasia, or heavy metal intoxication.

c. **Diagnosis:** Demonstration of toxin in stool, gastric aspirate/vomit, wound or serum of the patient or in a suspected food item. Isolation of the organism from stool, wound, or suspected food item is indicative of source.

3. **Incubation period:** Usually within 18-36 hours of eating contaminated food but may range 6 hours to 10 days. Wound botulism incubation is longer, approximately 10 days.

4. **Reservoir:** Spores are found in soil, aquatic sediments, the intestinal tract of birds, animals and fish, and agricultural products, including honey and vegetables.

5. **Source:** Toxins are produced by *C. botulinum* and rarely other clostridium species under anaerobic conditions, usually by improperly home-canned foods, especially low acid food (e.g. corn, beans, potatoes, fish and seafood, all meats) or mishandled foods that should have been refrigerated or improper handling during manufacturing (e.g. carrot juice, chopped garlic in oil, canned cheese sauce, and baked potatoes wrapped in foil). Also in contaminated, closed wounds, similar to tetanus (*C. tetani*). Although it is rare, localized injection of commercial botulinum neurotoxins (BoNT) for cosmetic or clinical indications (e.g., with Botox, Myobloc, etc.) may cause botulism.

6. **Transmission:** Ingestion of toxin, injection of commercial neurotoxin, or production of toxin in infected wound or GI tract.

7. **Communicability:** Not communicable person to person.

8. **Specific Treatment:** Botulism Antitoxin Heptavalent (HBAT) is an equine-based botulinum antitoxin and is the only botulism toxin approved by the U.S. Food and Drug Administration (FDA). For adults, one vial should be administered intravenously (IV). There does not appear to be any benefit from additional doses. Guidance for skin testing, desensitization, and dosing are included in



the antitoxin prescribing information. ACDC (business hours) or physician on call (afterhours) will contact the CDC Emergency Operations Center.

Antibiotics (e.g., penicillin G or alternatively metronidazole) are recommended for wound botulism in addition to debridement if needed. Therapy may need to be broadened due to risk of polymicrobial infection. The use of aminoglycosides is contraindicated since they have been reported to induce neuromuscular blockade.

9. **Immunity:** None.

## REPORTING PROCEDURES

1. Report any case or suspect case by telephone immediately, Title 17, Section 2500, *California Code of Regulations*.

- a. Call Morbidity Unit during working hours.
- b. After business hours, contact Administrative Officer of the Day (AOD) through County Operator.

2. **Report Form:**

### SUSPECT BOTULISM INTAKE AND CHECKLIST

### SUSPECT FOODBORNE OR UNKNOWN ETIOLOGY BOTULISM CASE INTERVIEW FORM

### BOTULISM CASE REPORT (CDPH 8547)

Upon consultation with the reporting clinician, the AOD is to complete intake/checklist and send to ACDC. AOD is to report to Chief or Deputy Chief of ACDC to determine actions to follow. ACDC will send case report via fax (510-620-3425) or email to CDPH Infectious Diseases Branch by the next business day.

3. **Epidemiologic Data:**

- a. Date and hour of onset of symptoms. Duration of symptoms. Record symptoms in order of their development.

- b. Food history for past 96 hours and method of food preparation. For instance, did they taste any home-canned foods after opening, but before cooking the food?
- c. Ingestion of aged fish and marine mammals (e.g., native Alaskan/Arctic foods associated with toxin E)
- d. Ingestion of improperly home-canned or preserved foods poses a high risk. Commercially canned foods are rarely involved unless mishandled.
- e. Ingestion of herbs, supplements, nutritional food or drinks (e.g., herbal tea)
- f. Location of remaining suspected food.
- g. Names, addresses, and ages of others that ate suspected food and time this occurred in addition to presence of any symptoms
- h. For wound botulism - onset of wound infection, how original wound occurred. (e.g., puncture, subcutaneous, deep space, abrasions, lacerations, fractures, incisions)
- i. For history of drug use: injection drugs, history of "black tar" heroin, inhaled cocaine use.
- j. Cosmetic or therapeutic use of botulinum toxin.
- k. For adult intestinal botulism: history of achlorhydria, gastrointestinal diseases, post-operative state.

## CONTROL OF CASE, CONTACTS, SPECIAL SITUATIONS & CARRIERS

Immediate investigation is required, regardless of time of day. Confiscate suspected food(s) for possible laboratory testing and notify others who may have suspected food in their possession.

### CASE:

**Precautions:** None



1. Immediate hospitalization at hospital with intensive care unit is essential.
2. Use of antitoxin must not await laboratory diagnosis if clinical findings are highly suggestive of botulism. Follow instructions carefully for dosage and allergic precautions.
3. While antitoxin does not reverse paralysis, it can prevent progression of illness and shorten its duration if administered early in the course of illness.
4. In addition to antitoxin, supportive care, including ventilator support if necessary, is the mainstay of botulism treatment. Additionally, neurology and infectious disease consultations may be very important in helping manage the patient's course.
5. In suspected foodborne botulism case, if it is difficult to obtain stool specimens, an enema with (preferably) sterile nonbacteriostatic water and non-glycerin-containing suppositories may be performed; tap water can interfere with laboratory testing and is not recommended.
6. Food history should be obtained for foodborne or unspecified botulism. Interview the patient or proxy (e.g. family members, if patient cannot be interviewed due to health conditions such as intubation) and complete Suspect Foodborne or Unknown Etiology Botulism Case Interview Form. Report the findings to ACDC once completed.
7. If foodborne is suspected, contact LAC DPH Wholesale Food and Safety (626-813-3477).
8. If a restaurant or commercial source is suspected, conduct an immediate inspection in coordination with the CDPH Food and Drug Branch Rapid Response Team by discussing with CDPH Infectious Disease Branch (510-620-3434) or CDPH Duty Officer (after hours 916-328-3605).
9. Suspected food sources should be collected and tested for toxin. Refer to Reporting Procedures.

10. A case of suspected wound botulism must be examined carefully to locate the site of infection for surgical debridement; appropriate antibiotics should be administered (see above).

**CONTACTS:** Household members or persons who shared a common source such as food or drug.

1. When a suspected food item is implicated in a foodborne botulism case, identify individuals who may have been exposed (e.g., consumed the suspected food item). Obtain the name, address and telephone number of every person who might have consumed the suspected food item.
2. If a cluster of botulism cases or suspected shared exposure is identified, obtain as much information as possible (e.g., the venue name, contact telephone number and attendance lists for every suspected gathering, public event, or other exposure)
3. Persons who ate food items potentially contaminated (this includes those who shared meals with the suspected botulism case, or those who ate a food item that has been recalled due to the risk of *C. botulinum* contamination) should be educated about the signs and symptoms of botulism and seek medical care immediately if symptoms develop. They should also be instructed to alert medical providers that they were potentially exposed to botulism when seeking medical care.
4. Determine if any leftovers or suspicious food items are still available and alert contacts to not eat those items until cleared by DPH. These items should be held at refrigerated temperature for evaluation by DPH.
5. Individuals who have shared drugs, needles, or other equipment with a wound botulism case may be at increased risk for developing botulism. Contacts can be instructed to self-monitor for signs of botulism and seek medical care immediately if symptoms develop. They should also be instructed to alert medical providers that they were



potentially exposed to botulism when seeking medical care.

6. For persons known to have eaten suspected food within 96 hours, purge with cathartics, give enemas, and maintain close observation. If symptomatic, treat as case.

**CARRIERS:** Not applicable

### PREVENTION-EDUCATION

1. If home canned/preserved/jarred foods are implicated, those responsible for preparing the canned/preserved/jarred foods person should be educated on food safety and proper preparation.
2. Boil home-canned vegetables and meat products for at least 10 minutes with thorough stirring, prior to tasting or eating.
3. Avoid contamination of wounds with soil or non-sterile substances.
4. For suspected wound botulism clusters potentially associated with contaminated drugs or drug paraphernalia: provide outreach to healthcare providers, drug treatment centers, and users about risks of wound botulism with injection drug use as well as risk mitigation strategies.

### DIAGNOSTIC PROCEDURES

Prior notification of Acute Communicable Disease Control Program (ACDC) is required for testing.

See **SPECIMEN SUBMISSION GUIDELINES FOR SUSPECTED BOTULISM** for complete instructions on specimen collection and submission. In brief:

1. **Stool Samples:** Submit at least 25g of unpreserved feces specimen. Sterile water enemas may be necessary to obtain specimens. Fecal specimens should be refrigerated.

**Container:** Sterile container with lid.

**Laboratory Form:** **Test Requisition Form H-3021.**

**Examination Requested:** Botulism.

2. **Blood Sample:** Treating facility obtains four 10 cc red-top or serum-separating vacutainer tubes from patient prior to the administration of antitoxin and submits it to PHL with other clinical specimens. Specimens should not be spun, aliquoted or further manipulated. Post-treatment serologic testing of botulism cases and suspects is not indicated.

Mouse bioassay is performed by the PHL.

Matrix Assisted Laser Desorption/Ionization Time of Flight Mass Spectrometry (MALDI-TOF) can be performed by the CDC.

3. **Food Samples:** Must be collected by a Wholesale Food and Safety (Environmental Health) specialist under ACDC direction.

**Container:** Original container or a clean, covered container.

4. **GASTRIC CONTENTS, ASPIRATE or VOMITUS - for both foodborne AND wound botulism**

Submit 25-50 ml of gastric material taken before lavage in a clean, dry container without transport media.

Only samples taken within 48 hours of admission will be accepted.

Label as GASTRIC ASPIRATE or VOMITUS with 1) patient name, 2) date and time collected, and 3) medical record number.

**Laboratory Form:** **Test Requisition Form H-3021.**

**Examination Requested:** Botulism.

**Material:** Suspected food.

**Storage:** Refrigerate.

5. **Wound Culture:** Treating facility obtains anaerobic cultures of wounds or abscesses



for processing by the hospital laboratory. If possible, collect with a laboratorian in attendance for immediate anaerobic processing. Sample any evident wounds, including fracture sites; submit aspirate, excisional biopsy, or swab. Place in anaerobic

transport pouch, keeping chilled at all times. If a clostridium species is isolated, consult Public Health Laboratory for instructions on submission.



## INFANT (INTESTINAL) BOTULISM

Botulism in infants less than 12 months of age was first described in 1976. Infant botulism, correctly known as intestinal botulism, affects children under 1 year of age almost exclusively but can affect adults (see below) who have altered GI anatomy and microflora. Following ingestion of spores, production of toxin occurs within the gut lumen. The illness usually begins with constipation followed by lethargy, listlessness, poor feeding, ptosis, poor head control, and difficulty in swallowing; it has been termed "floppy baby" syndrome. Identified food sources, such as honey and corn syrup, should never be fed to infants.

The local health department's only responsibility is immediate telephone reporting of suspected cases to the CDPH. All suspected cases are investigated by the Infant Botulism Treatment and Prevention Program, in the California Department of Public Health's Division of Communicable Disease Control. Call (510) 231-7600 (24 hours a day, 7 days a week, including holidays). Excellent background information and family materials in English and Spanish are available on the program website at <http://www.infantbotulism.org/>.

## ADULT INTESTINAL BOTULISM

*In vivo* botulinum toxin production in the non-infant gastrointestinal tract has been rarely reported. This has also been termed adult intestinal or enteric botulism. Persons with intestinal abnormalities such as previous surgery, inflammatory bowel disease or diverticulosis may have a blind intestinal pouch that does not empty normally, allowing GI contents to remain for longer than normal. If spores of *C. botulinum* are present, they may germinate and produce botulinum toxin.

## WOUND BOTULISM

Wound botulism results when spores of *C. botulinum* germinate in a wound, producing botulinum toxin. Previously this was extremely rare and usually associated with traumatic injuries such as punctures or open fractures. Wound botulism attributable to injecting drug use was first reported in 1982 in New York City.

Since 1995, California has seen an explosion of wound botulism among injectors of illicit substances, principally a form of heroin called "black tar." Unlike botulinum toxin, which is destroyed by heating, spores of *C. botulinum*, which may be in the heroin or one of the solvents employed by injecting drug users, are NOT destroyed by briefly boiling the heroin-solvent mixture. In most cases, injection is subcutaneous rather than intravenous, allowing for abscess formation and toxin production in the wound. Wound botulism has also been described in persons with intranasal abscesses who sniff cocaine chronically.

A thorough physical examination for an occult wound is indicated when the food history does not suggest a typical source for botulism. Debridement and drainage of infected wounds plus antibiotic treatment are crucial to stopping further toxin production. Treatment with heptavalent botulinum antitoxin is also indicated.